DE GRUYTER OPEN

South East European Journal of Economics and Business
Volume 11 (1) 2016, 54-66
DOI: 10.1515/jeb-2016-0004

ECONOMIC STRUCTURE AND REGIONAL ECONOMIC PERFORMANCE IN ADVANCED EU ECONOMIES

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Abstract

Recent economic turmoil has revived interest in the quest for sustainable growth. Current economic thinking attaches growing importance to industrial development. The roots of such thinking can be traced back to traditional arguments about the beneficial role of manufacturing for economic growth through horizontal and vertical spillovers to other sectors. These spillovers are of particular importance at the regional level, as such externalities tend to be localized in nature. The objective of this paper is to explore the relationship between economic structure and regional growth in ten Western European EU member states in the post-crisis period. The analysis wishes to answer the question of whether regions with a higher concentration of manufacturing outperform their counterparts with more diverse economic structures. A spatial panel econometric technique is applied in order to distinguish between the intra-regional and inter-regional effects of economic structure, yielding recommendations for policy makers in the field of industrial policy.

Keywords: *growth, manufacturing, spatial panel model, regional analysis, industrial policy*

JEL: *L16, O14, R12*

1. INTRODUCTION

The relationship between changes in economic structure and growth has attracted the interest of economists for quite a long time. It was noted already in the 1950s by Clark (1957) that economic advancement is supplemented by a shift from agriculture towards manufacturing and in turn towards services. Recent decades have, if anything, provided substantial amount of empirical evidence in favor of such reasoning (Brown, 1988; Jasinowski, 1992; Kollmeyer, 2009; Rowthorn and Coutts, 2013; Rodrik, 2015). Across the developed world one sees once predominantly manufacturing landscapes being transformed into pools of service activities. This phenomenon, commonly known as deindustrialization, has been widely discussed and analyzed by both academics and policy makers. While for some its occurrence is a consequence of a common development path of nations,

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others are more concerned with its growth implications. It is being argued, in that context, that manufacturing offers much stronger growth potential than the service sector.

There are several reasons why manufacturing may exert a beneficial effect on economic growth. Economies of scale and extended scope for learning, as well as potential for application of its knowledge and technologies in other sectors, are only some of the reasons why manufacturing is considered to be the engine of technological progress (Szirmai, 2009). A particularly important feature of manufacturing is its spillover effects to other economic sectors through backward and forward linkages between economic agents in the vertical production chain, as well as horizontal spillovers between competitors. Recent economic turmoil raised numerous questions about European growth policies. A growing number of academics and policy makers nowadays argue that the road towards growth and a better standard of living in the post-crisis European environment leads through reindustrialization. The recent Competitiveness Report of the European Commission (2013), for example, refers to manufacturing as the engine of the modern economy. Similarly, Corrocher and Cusmano (2014) provide analysis that questions the common wisdom on the importance of knowledge- intensive services for economic growth.

The objective of this paper is to explore the relationship between economic structure and growth at the regional level in ten advanced EU member states in the post-crisis period. Bearing in mind that manufacturing spillover effects tend to be localized in nature the analysis is undertaken at the level of NUTS2 regions. Both intra-regional and inter-regional effects of economic structure on growth are assessed through the use of a spatial econometric model. The rest of paper is organized as follows. Section 2 is a discussion of the relationship between regional economic structure and growth. The analysis of regional economic structure and growth in the post-crisis period of the analyzed countries is described in section three. Section four presents an econometric model of investigation while the results of an econometric investigation are revealed in section five. Section six concludes the paper.

2. *REGIONAL ECONOMIC STRUCTURE AND GROWTH*

The investigation of economic growth has often been made with the nation state as the unit of observation. Moreover, there is literature concentrated on the relationship between growth and economic structure. Jula and Jula (2013) stress the premise of Dobrescu (2011), which cites and investigates this literature, beginning with Fisher (1939) and Clark (1957) up to Echevarria (1997), Dietrich (2009), and Memedovic and Iapadre (2010). Memedovic and Iapadre (2010, pp. 3-5) go even further back, referring to the Physiocrats and the beginning of classical economics: "Since its origin, economic theory has given significant attention to structural change. For Adam Smith, structural features were significantly connected to the stage of economic development, while for Ricardo the changing composition of the productive system was a requisite for economic growth". In his paper, Dobrescu (2011) investigates the relationship between sectoral structure and economic growth using data on the world economy spanning the period 1970 to 2008.

The research of Chenery (1968, 1975, 1977) and other authors into the development patterns of a large number of Third World countries in the post-1950 period found that modern economic development is significantly impacted by country size, factor endowments, and availability of capital. Three types of development were noted: big countries with low ratios of trade to GNP and usually low capital inflow; small countries with a relative specialization in the export of primary products; and small countries with a relative specialization in the export of manufactures. However, while smaller countries expanded through export-oriented development, larger countries were sustained by higher levels of internal demand, and trade dependency was limited by import substitution. If, as these studies say, economic development represents a reproducible experience with a limited number of patterns, then this should be true at the regional as well as at the national aggregate level (Lee, 1981).

During the last two decades, other studies have very intensively discussed the relevance of human capital for economic growth (Čadil et. al, 2014). The theoretical emphasis on human capital was laid mainly by endogenous growth theory, starting with Arrow (1962) and Uzawa (1965). Nelson and Phelps (1966) were among the first authors to emphasize the significance of human capital in technology adoption and its influence on economic growth. However, the concept of human capital was fully integrated later, mainly in studies of Romer (1986) and Lucas (1988). Many scientific articles and analyses oriented towards human capital and growth followed – Barro (1991) finds human capital to be one of main determinants of per capita income, Aghion and Howitt (1998) emphasize the relevance of human capital as a factor promoting higher investment in technology with positive impact

on growth. However, there are several studies against the common attitude that point to an insignificant relationship between human capital and economic growth, possible reverse causality or the presence of an omitted variable that artificially links human capital with economic growth (Bils and Klenow 2000).

On the other side, the majority of studies are not part of such direct opposition. Sometimes they focus on the unequal or asymmetrical impact of human capital on competitiveness and economic growth. The results of these studies often include the positive impact of human capital, which differs between countries or regions. Krueger and Lindahl (2001) found that the impact of education on economic growth varies among countries. López-Bazo and Motelón (2012) conclude that there is a difference in the education effect on regional wages. Ramos et al. (2009) stress that the effect of human capital represented by education level can even have a negative effect on unemployment connected to over-education. Recent developments in Spain and other, mainly southern Europeean countries truly reveal that education level itself could not lead to higher growth rates and lower unemployment levels. It seems more likely that education should reflect the economic structure of the region and its market needs. Alternatively, there is research that analyzes economic growth at the regional level in order to provide a complete and more accurate picture of national growth and to understand more fully the nature of the process of economic change.

Before continuing with this background theory analysis, it is necessary to define what the characteristics of regional economic growth are. These can be explained using a general sequence of stages through which regions move in the course of their development. According to North (1955), the first stage in the economic history of most regions is one of a self-sufficient subsistence economy in which there is a low level of investment or trade. The basic agricultural stratum of the population is simply located according to the distribution of natural resources. In the second stage, parallel with improvements in transport, the region develops some trade and local specialization. "A second stratum of the population comes into being, carrying on simple village industries for the farmers. Since the materials, the market, and labor are all furnished originally by the agricultural populations, the new 'industrial superstructure' is located in reference to that 'basic stratum' (Hoover, 1937). The third stage includes the increase of interregional trade from which the region tends to move through a succession of agricultural crops, from extensive grazing to cereal production to fruit growing, dairy farming, and truck gardening.

With increased population and diminishing returns in agriculture and other extractive industries, a region has to become industrialized. "Industrialization means the introduction of so-called secondary industries (mining and manufacturing) on a considerable scale." Typically the early stages of industrialization are built on the products of agriculture and forestry and include such activities as the processing of food, the manufacture of wood products, and the preparation of textile fibers. If industrialization is to continue, mineral and energy resources become critical (North 1955, Hoover and Fisher 1949). A fifth stage of regional growth is accomplished when a region specializes in tertiary industries producing for export. Such a region exports to less advanced regions capital, skilled personnel, and special services. The importance of transport costs has been evident in the advancement through these successive stages of growth.

The structural change investigated by Kuznets (1966) was based on a three-sector economy including agriculture, a manufacturing sector, and services, and in which the growth process was characterized by a movement of resources from agriculture to manufacturing and probably more modestly into services, although reallocation of resources within the service sector was seen to be relevant. Deane and Cole (1962) analyze structure using an eight-sector disaggregation, while Aldcroft and Richardson (1969) invoke structural change without quantifying its scale or nature. Although these studies have presented certain aspects of the economic structure, this problem of economic structure can be considered rather in more detail, in terms of a greater than threefold or eightfold sectoral disaggregation, before giving conclusions on the scale or impact of structural change.

According to Lee (1981), broad areas of research may conceal various significant elements of structural change, just as a national approach may conceal relevant variations of a certain region. His structural analysis is based on 27 industrial orders or sectors. By taking into consideration structural change in some detail, Lee (1981) examined the impact on regional employment structures to assess whether the traditional structural categories are in fact as homogeneous as their usage suggests they are thought to be. His conclusion justifies disaggregation at the regional level, and suggests that modern economic growth is reproducible and takes a limited number of forms. His measurement of the relationship between sectors of employment across regions suggests that the traditional threefold division into agriculture, manufactures, and services is not important at all and even misleading.

Besides considerable country-specific and cross-national research, regional analyses dealing with human capital and growth have been increasing. Regional human capital endowment is, next to national models, considered as one of the factors of regional economic growth (Cheshire and Margini, 2000 or Di Liberto, 2008). It is usually reckoned as one of the possible factors of differences and divergences in regional wages, income and productivity, especially in relation to migration flows (Faggian and McCann 2009). Furthermore, Čadil et al. (2013) come to a conclusion on the European level when the impact of human capital on wages and household disposable income was found significant only for regions with specific economic structure. Čadil et al. (2014) stress that regional economies were influenced differently and that human capital itself is no guarantee of quick recovery from a recessionary period.

Other studies focus on the importance of the spatial structure factor on regional economic growth. The work of Englander (1926), Ritschl (1927), Weigmann (1931), and von Boventer (1963) initially exemplified this field of analysis. It is explicitly concerned with the nature of an economy in a spatial setting, and the better-known work of Losch (1954) is very much in this tradition. The connection between a region's economy and its spatial structure has a particular significance when viewed in dynamic terms. Parr (1987) stresses the example in which existing sectors of an expanding regional economy are subject to technical change, and the assumption is that possibly important modifications in their locational characteristics result from a different spatial structure. A similar result could be expected if existing sectors are replaced with new sectors that have substantially different locational requirements. Research by Boisvert (1978), Friedmann (1956), and Johnson (1970) is oriented towards these processes and more generally to the impact of economic change on regional spatial structure. Lastly, the nature and pace of regional economic change over a given period may be influenced by the form of the spatial structure at the start of the period (Parr, 1979).

Parr (1987) has stressed that the process of regional economic growth could be connected to a variety of different transformations in the spatial structure, a variety that appears to be related to the differing conditions accompanying the process of regional economic growth. Many studies of spatial structure development have paid only scant attention to such influences. Parr (1987) concludes that changes in the spatial structure appear to be related to a group of factors that includes the locational characteristics of the dominant type of economic activity, the relevance of economies of scale in production, the agglomeration economies and diseconomies, the efficiency of communication and transportation systems (inter-regional, intra-regional, as well as intra-metropolitan), the level of per capita income and the locational preferences of households. The interactions among these factors appeared to determine the nature of spatial structure development under conditions of economic growth.

3. *REGIONAL ECONOMIC STRUCTURE AND GROWTH IN THE POST-CRISIS ENVIRONMENT*

The past decades have witnessed a reshaping of the economic landscape across a number of EU Member States. The share of manufacturing in output and employment has been declining in a process known as deindustrialization. Traditionally this process was linked to a rise in living standards and the development of EU economies as predicted by theories of long-term structural change. In recent years, this process has accelerated further. The burden of financial and construction sector bubbles that brought the latest economic downturn was more severely imposed on the manufacturing sector than on services. In a parallel development, the competitive pressure of importers on the EU market was intensifying over the past decade in both low and high technology intensive manufacturing sectors. Yet a recent Competitiveness Report of the European Commission (2013) notes that exports of manufacturing goods were among the principal driving forces behind the recovery of EU economies. It can be argued on these premises that future growth of European economies will require the reversal of deindustrialization trends and the rebuilding of a competitive and strong manufacturing sector.

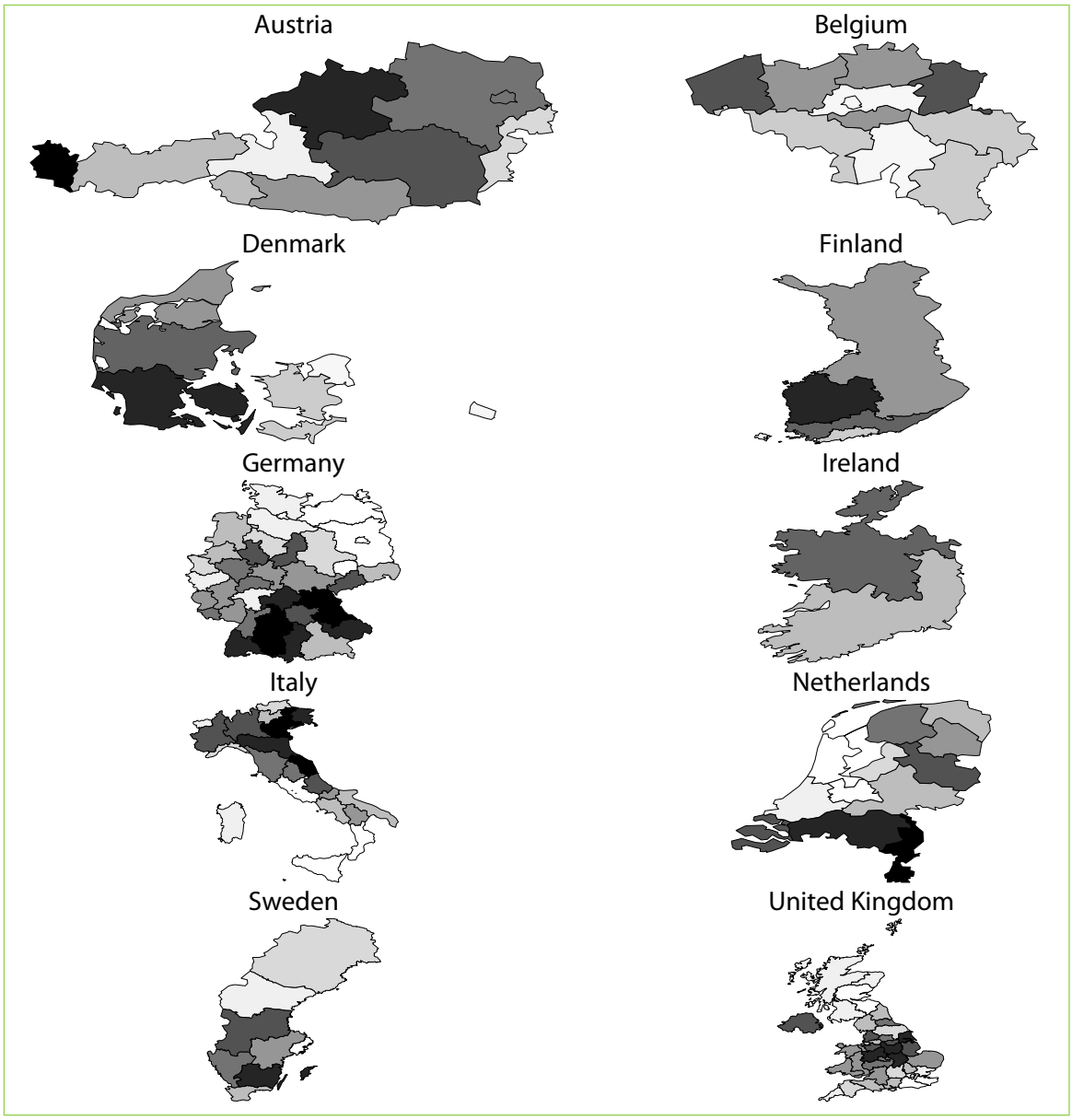
Analysis of the economic structure at the national level in many European countries has been subject to investigation by many authors over the past few decades. However, the economic structure of regions within individual member states has attracted far less attention. To some extent, this can be attributed to the low availability of data at lower levels of territorial organization. While in some countries such data are completely non-existent, in others data for only some of the regions are available. The understanding of processes taking place at the regional level is particularly important as vertical and horizontal spillover effects of manufacturing on other sectors tend to be localized in nature.

For the purpose of this analysis the data on 148 NUTS2 regions from ten European Union Member

States (Austria, Belgium, Germany, Denmark, Finland, Ireland, Italy, Netherlands, Sweden and United Kingdom) was utilized. The data is taken from the Eurostat database and covers 2012, the year when these economies were already on the path to recovery. The main constraint in the selection of countries and the choice of variables to be included was data availability, as for many European regions relevant data is missing. Within these constraints, data was obtained on growth, the structure of regional employment and value added, population density, innovation intensity and unemployment rates.

Changes in economic structure are usually analyzed in terms of either employment or the output shares of particular sectors in an entire economy. Several authors note that the employment share presents a better measure of deindustrialization than output-based indicators (Saeger, 1997; Rowthorn and Ramaswamy, 1997; Cowie and Heathcott, 2003; Rowthorn and Coutts, 2013). An analysis of the regional economic structure in the post-crisis period based on the share of manufacturing employment in total employment is presented in Figure 1, where the darker colors refer to regions with higher shares of manufacturing employment. A close analysis of the numbers behind Figure 1 reveals that the regions with the highest share of manufacturing employment, ranging around 30 percent, are in south of Germany in Bayern

Figure 1: Manufacturing share of total employment NUTS2 regions



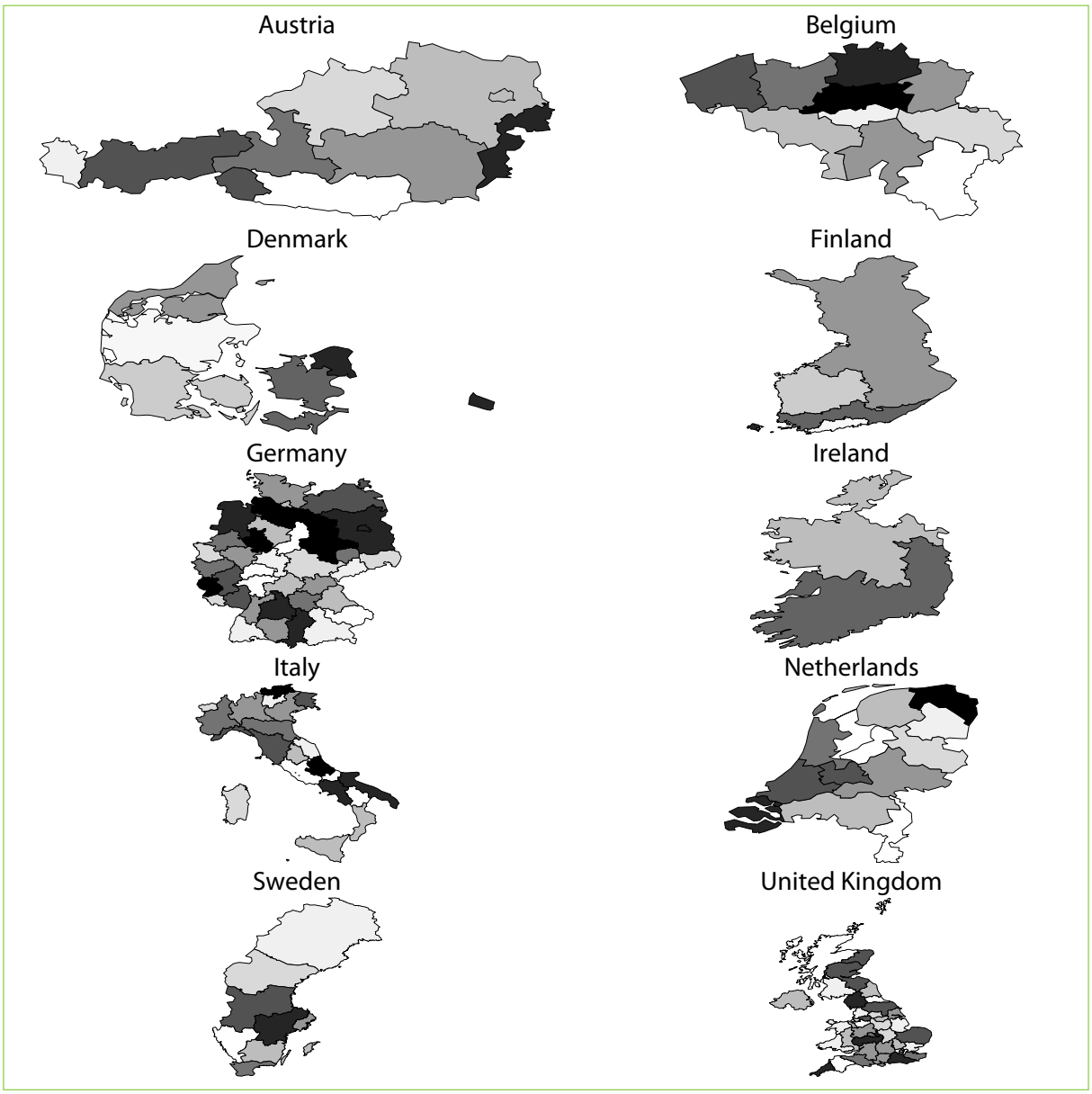
Source: Authors' calculations based on Eurostat
Darker colors refer to a higher employment share of manufacturing; they differ across countries

and Baden Wurttemberg and the northern Italian regions. At the opposite end, with manufacturing employment counting for as little as 3 percent, are the large metropolitan areas of London and Bruxelles. In all further analyzed regions the share of manufacturing in total employment ranges between 6 and 25 percent.

As noted earlier, the contribution of manufacturing to growth is likely to be more pronounced at the regional level due to the localized nature of its externalities. The analysis of regional growth rates taken as well from Eurostat is shown in Figure 2. The findings are somewhat heterogeneous across the analyzed countries. On the one hand, in countries such as Italy, Sweden, Belgium, Germany and Finland, more than half of the best performing regions (whose growth falls in the upper quantile) are regions where the share of manufacturing employment is among the highest in these countries. On the other hand, in all other countries regions with lower shares of manufacturing employment are those where the highest growth rates are recorded.

Two explanations can be offered for the above-mentioned finding. First, the principal impulse to regional growth in the analyzed period originated in services rather than in manufacturing. Second, it is likely that the manufacturing sector of analyzed countries is characterized by high-technology intensive industries. In the latter case, the labor intensity of

Figure 2: Growth of GDP per capita (NUTS2 regions 2012)

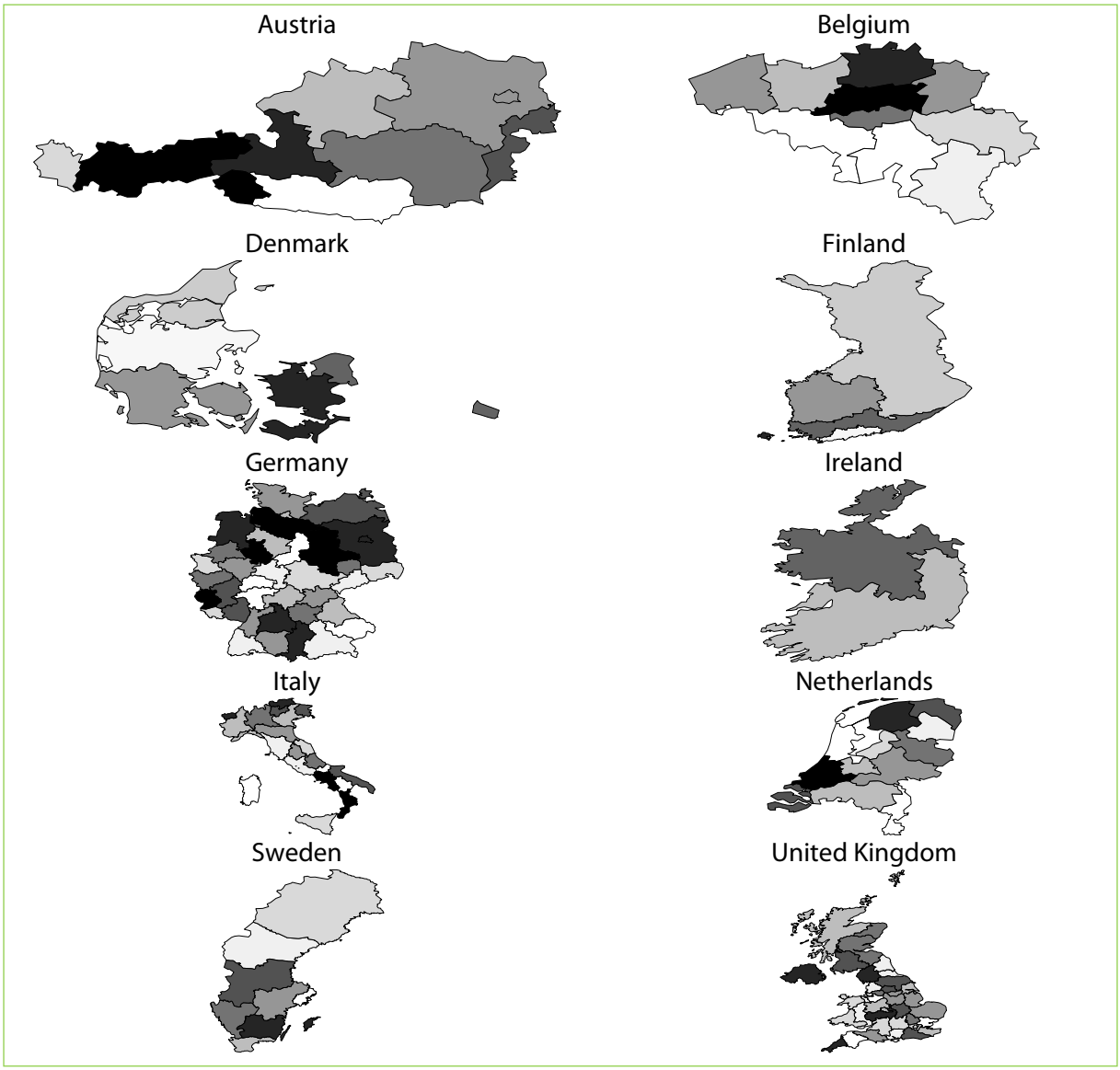


Source: Authors' calculations based on Eurostat
Darker colors refer to higher growth of GDP per capita; they differ across countries

manufacturing (and thus its share in regional employment) would be low, but its share in generated value added would be higher. The latter explanation seems more plausible if one looks at regional growth rates of value added in the manufacturing sector (Figure 3). In all of the analyzed countries regions with the highest quantile growth rates of GDP per capita are also the regions with the highest growth of value added in manufacturing.

When taken together these findings reveal a story consistent with the predictions of endogenous growth models and theories of long-term structural change: specialization in sophisticated industries with high value added bears potential for differentiation and the achievement of above average growth rates. By its nature such activities are characterized by low labor intensity and place instead emphasis on knowledge and technology. In the short run restructuring from the production of standardized products towards industries of higher technological intensity may cause the contraction of the labor market, particularly among low skilled employees. However, in the long run these effects are offset through the impact of demand for final goods on the creation of new jobs and the vocational retraining of displaced workers from other sectors. Bearing everything said above in mind our findings can be understood as evidence that the analyzed regions are going through the process of building their competitiveness in sophisticated knowledge and technology intensive industries.

Figure 3: Manufacturing value added share growth (NUTS2 regions 2012)



Source: Authors' calculations based on Eurostat
Darker colors refer to higher employment share of manufacturing; they differ across countries

4. MODELLING OF INTRA- AND INTER-REGIONAL LINKAGES BETWEEN GROWTH AND ECONOMIC STRUCTURE

As was pointed out earlier, the importance of manufacturing for economic growth lies in its beneficial impact on other economic sectors. This impact takes place through several channels, such as the movement of workers (and their knowledge) among companies, the transfer of knowledge and technology among upstream and downstream firms in a vertical production chain and the spillovers generated through competition of firms within a particular industry. An important feature of these channels is their localized nature. For this reason, it can be expected that the beneficial effects of manufacturing on economic growth will be spatially limited to regions where firms are located and their surroundings. To explore the spatial existence of intra-regional and inter-regional spatial effects of economic structure on growth a model is developed in the form:

$$\begin{aligned}&\text{growth}_i = \\ &c_0 + \rho \sum_{j=1}^{n} w_{ij}\text{growth}_j + \beta_1 \text{employment growth}_i + \\ &\beta_2 \text{value added growth}_i + \beta_3 \text{population density}_i + \\ &\beta_4 \text{innovation intensity}_i + \beta_5 \text{unemployment rate}_i + \\ &\beta_6 \text{GDP level}_i + \theta_1 \sum_{j=1}^{n} w_{ij}\text{employment growth}_j + \\ &\theta_2 \sum_{j=1}^{n} w_{ij}\text{value added growth}_j + \lambda \sum_{j=1}^{n} \varepsilon_j + u_i\end{aligned} \quad (1)$$

The dependent variable in equation (1), *growth*$_i$ is the annual growth rate of GDP per capita of cross-sectional units (region) *i*. It is modelled as a function of its own spatial lag (*growth*), economic structure and a number of control variables. The spatial lag of the dependent variable *growth*$_j$ establishes a direct relationship between the dependent variable for region *i* and the dependent variables of other regions *j*. The expression $\sum_{j=1}^{n} w_{ij}\text{growth}_j$ can be interpreted as the interaction effect of the dependent variable *growth*$_i$ and *growth*$_j$ the dependent variable of other spatial units. In the above expression the w_{ij} stands for the i,j-th element of a non-negative NxN spatial weights matrix W and ρ is a spatial dependence parameter. The inclusion of a dependent variable's spatial lag is intended to control for inter-regional (between-regional) growth effects. There are several channels through which the economic performance of some regions may exert impact on their counterparts. Sourcing of intermediate inputs and workforce from neighboring regions raises the revenues of their firms and the income of their residents. In both cases a positive effect on the growth of neighboring regions can be expected. Yet at the same time the movement of workers towards more prosperous regions reduces the pool of workforce in neighboring regions, which may exert adverse effects on their economic performance as predicted by core-periphery models.

The modelling of economic structure draws on the existing restructuring literature, which defines restructuring as a multidimensional concept that cannot be assessed by means of a single indicator. To this end, and subject to data availability, two variables are included in the model, the regional share of manufacturing in total employment growth (*employment growth*$_i$) and the regional share of manufacturing in total value added growth (*value added growth*$_i$).

The effect of employment structure on growth will depend on the characteristics of the regional manufacturing sector. In regions where manufacturing consists mostly from standardized labor intensive industries a positive sign of this variable can be expected. However, in regions whose manufacturing sector consists mostly of sophisticated knowledge intensive industries or where services form the backbone of local economy the demand for employment in the manufacturing sector will be lower and thus a negative sign can be expected. To further control for these issues a variable measuring growth of regional share of manufacturing in total value added is included. Due to their potential for differentiation, knowledge and technology-intensive industries are characterized by higher value added than standardized labor and resource intensive sectors. A higher proportion of regional value added generated within manufacturing would signal the prevalence of these industries in regional economic structure. In line with predictions of endogenous growth models a positive effect on growth can be expected.

For both economic structure and growth of value added share the model distinguishes between intra-regional (within-regional) and interregional (between-regional) effects. The inclusion of their spatial lags (*employment growth*$_j$ and *value added growth*$_j$) is intended to control for the previously described effects of individual regions on their surrounding areas. A positive effect would signal the existence of demand and supply side spillovers that take place through the sourcing of inputs, the demand for final goods and the rising living standard of the population from surrounding regions employed in prosperous ones. The negative sign, however, would be more consistent with predictions of core-periphery models, according to which a higher concentration of economic activity in particular geographic areas exercises an adverse effect on other geographic areas and leads to a spatial

polarization of economic activity. For both variables the expression $\theta \sum_{j=1}^{n} w_{ij}$ refers to the interaction effect of independent variables from spatial units *j* and the dependent variable for region *i* where w_{ij} is the i,j-th element of a non-negative NxN spatial weights matrix. An alternative interpretation of these effects would be the effect of independent variables from region *i* on the dependent variables of all other regions *j*.

In addition to these key variables of interest a model includes several other control variables. A level of GDP per capita (*GDP level*$_i$) from the previous year is included to control for the level of development of individual regions. The density of population (*population density*$_i$) measured as an absolute value of the average population per square kilometer controls for between-industry agglomeration externalities. For a long time economists have recognized that greater density of population increases demand for final goods and services and acts as a source for a larger workforce pool. For this reason a positive sign can be expected for this variable. The innovation intensity (*innovation intensity*$_i$) of the region is defined as the relative (in relation to national average) number of patents registered to an EPO in a given region and year. The greater intensity of innovation can be associated with higher knowledge intensity and the quality-driven competitiveness of regional firms, all of which lead to above average returns.

The last variable to enter our model is the unemployment rate (*unemployment rate*$_i$). Traditional research on the relationship between unemployment and growth has predicted that in the long run growth and unemployment are in a negative relationship. Over the past decade or so a research field has emerged investigating the relationship between the two in the short run and in the context of business cycle fluctuations (Martin and Rogers, 2000). The general message from this literature is that in economies where learning by doing is a principal driving force behind growth, the effect of unemployment on economic growth will be negative as it implies foregone opportunities for human capital accumulation. Such an effect can be expected in periods of recession, for which reason a negative sign on this variable can be expected.

The analysis of the previously described model is undertaken with a spatial Durbin econometric technique. The particular feature of this technique is its ability to control for spatial correlation not only in the dependent variable but also in independent variables and in the error term. Hence, our modelling strategy allows for full spatial correlation. An important item in spatial econometric analysis is the choice of spatial weighting matrix, a quadratic matrix that defines relationships between units (regions) in space. In our analysis, a row standardized inverse distance spatial weights matrix is used, allowing spatial correlation across all regions. The validity of model was verified by means of a number of model diagnostics tests presented in Table 1.

Table 1: Model diagnostics

Spatial weights matrix	Inverse distance
Number of observations (regions)	148
Log likelihood function	-213
Wald test	85.64***
LR TEST SDM vs. OLS H_0:(p=0)	90.92***
LR TEST H_0:($wX's$=0)	52.97***
p	-0.00004***
Acceptable range for p	-0.0001<<0.0000
Spatial Error Autocorrelation Tests H_0: (no spatial error autocorrelation)	
Global Moran MI	0.25***
Global Geary GC	0.74***
Global Getis-Ords GO	-0.25***
Moran MI Error Test	21.47***
LM Error (Burridge)	174.09***
LM Error (Robust)	1.09
Spatial Lagged Dependent Variable Tests H_0: (no spatial autocorrelation)	
LM Lag (Anselin)	229.12***
Lm Lag (Robust)	56.12***
General Spatial Autocorrelation Tests H_0: (no general spatial autocorrelation)	
LM SAC (LMErr+LMLag_R)	230.21***
LM SAC (LMLag+LMErr_R)	230.21***
Heteroscedasticity H_0: (homoscedasticity)	11.74
Normality (Jarque Berra) H_0: (Normality)	0.49
Regression Specification Error – RESET H_0: (Model is specified)	1.013

Note: ***,** and * denote statistical significance at 1%, 5% and 10% significance level
Source: Authors calculations

All diagnostics relevant for spatial regression techniques provide support to our specification. The reported value of ρ coefficient lies within an acceptable range, suggesting that the dependent variable follows a spatially integrated process SI(0). Two LR tests were carried out in order to determine whether spatial or conventional econometric techniques should be used. The null hypothesis of coefficient ρ being equal to zero, i.e. the absence of spatial effects in the

dependent variable, is rejected with very high probability. Similarly, an LR test for spatial effects of independent variables rejected the null hypothesis of spatial coefficients on these variables being equal to zero with very high probability. On the basis of these findings spatial estimation techniques should be preferred over conventional econometric analysis (Elhorst, 2013; Shehata and Mickaiel, 2014).

Further analysis of model validity included conventional and robust Lagrange Multiplier (LM) tests for the existence of spatial effects in the dependent variable, independent variables and error term. Analysis of conventional and robust LM tests (Burridge, 1980; Anselin, 1988) indicates that a spatial Durbin model should be given preference when LM tests for both the spatial lag and spatial error are significant, or the conventional LR tests and robust LM tests point to different models (Elhorst, 2010; Shehata and Mickaiel, 2014). Based on this rule the findings from Table 1 suggest that the spatial Durbin model should be used in our estimation. Similarly, Global Moran, Geary and Getis-Ords tests reject the null hypothesis of no spatial autocorrelation in the error term.

The testing procedure reveals that our model does not encounter non-normality issues, while the Regression Specification Error - RESET test provides support to the chosen specification. The null hypothesis of no heteroscedasticity, however, is rejected, for which reason robust standard errors and the Huber-White robust matrix are used. Overall, the tests performed tests provide support to our model and enable us to proceed with interpretation of the results.

Table 2: Results of estimation

Variable	Coefficient
Spatial lag of dependent variable (Growth)	-0.00004***
Ecconomic Structure (Employment share)	-0.11***
Value added share growth (VA growth)	0.11**
Population density	0.0001
Innovation intensity	0.40
Unemployment rate	-0.37***
Initial GDP level	-0.0001***
Economic structure – spatial lag	0.00002***
Value added share growth – spatial lag	0.0001***
Constant term (cons)	10.53***

Note: *p*-values in brackets where ***,** and * denote statistical significance at 1%, 5% and 10% levels of significance respectively. Robust standard errors used.

Source: Author's calculations

The results of the estimation are shown in Table 2. Starting with the spatial lag of the dependent variable it is evident that the coefficient is statistically significant with a negative sign. Such a finding suggests that the better economic performance of some regions has an adverse effect on other areas. As noted by core – periphery models, migration towards prosperous areas widens regional development gaps. As increasing economic activity is concentrated in core areas, their ability to exploit economies of scale and learning, as well as other between and within industrial agglomeration externalities, grows cumulatively. The coefficient on the variable measuring the regional share of manufacturing in total employment is statistically significant and negative. As we noted in the previous section two possible explanations can be offered for such finding. On the one hand, the reported finding may signal that the backbone of regional growth is in services rather than in the manufacturing sector. On the other hand, it may also signal the transitioning of the regional economic structure towards less labor intensive sectors of manufacturing.

The latter finding seems more convincing if one looks at the findings for the proportion of value added generated within the manufacturing sector. An increase in the share of manufacturing in regional value added positively contributes to regional growth. When taken together with the findings on regional employment structure this finding seems closer to the thesis that sophisticated knowledge and technology intensive manufacturing have a positive effect on the economic growth of the analyzed regions. Furthermore, the spatial lags of both variables provides further support for such reasoning. An increase in the share of manufacturing in employment has a negative effect on the growth of other regions. It is likely thus that the migration of workers towards prosperous areas reduces the quality of human capital in additional regions. At the same time, we can observe a positive effect of an increase in the share of manufacturing in total value added on the growth of other regions. It is likely thus that spread mechanisms of agglomerations are in effect here through sourcing of inputs from firms in other areas.

Among the control variables significant coefficients were reported on variables controlling for initial level of GDP and unemployment rates. Both variables have negative signs. While the finding on initial GDP per capita level is something commonly reported in studies dealing with growth related issues, the finding on the unemployment rate is particularly interesting in the context of the overall paper. As noted earlier, for regions and countries whose growth is built on learning by doing processes the extent of unemployment

is particularly relevant. Displaced and unemployed workers in such settings present unexploited learning potential. Suboptimal accumulation of human capital has an adverse effect on the economic performance (or growth) of these regions and countries. It is for these reasons that in the crisis and immediate post-crisis periods the effect of unemployment on growth will be particularly pronounced. Our finding can be seen in such a context.

5. CONCLUSION

One of the main objectives for policy makers across the world is to increase the ability of their nations to grow and to provide their citizens with a better standard of living. The accomplishment of this task requires an underlying economic structure capable of generating a sufficient amount of jobs, withstanding the pressure of competition in a globalized world and yielding sustainable rates of growth. The recent economic crisis has pointed to numerous weaknesses in the economic model pursued by many economies based on the promotion of the service sector. Early post-crisis reports suggesting that the recovery is largely driven by exports from manufacturing have after several decades revived interest in the question of industrial development. Proponents of reindustrialization are being found among academics, businessmen and policy makers. Questions pertinent to their thinking concern whether the development of industry can be encouraged and the kinds of industries Europe needs.

Unlike traditional neoclassical economics, contemporary growth models with roots in endogenous growth theory suggest that specialization in knowledge and technology intensive activities bears higher growth potential than the production of standardized, labor intensive products. A particularly important implication of these theories is that through investment in knowledge and the strengthening of innovation capacity above-average growth rates can be sustained over a longer period of time. Building on these premises, the growth and development strategies of many economies across the world devote particular attention to investment in knowledge and strengthening of their innovation potential. Similar trends of building a knowledge-driven economy are present in the post-crisis EU and incorporated into the core of its strategic documents.

The question of economic structure should not be approached only from the perspective of growth and industrial policy, as its implications also extend over cohesion and regional inequalities. While the benefits of manufacturing for economic growth are well known and widely discussed, the localized nature of its externalities poses the risk of a widening regional development gap that brings with it a number of other economic, social and demographic problems. As a result, the shaping of industrial policy in post-crisis in Europe is a multifaceted problem that has widespread implications in a variety of areas.

Our analysis of 148 regions from West European EU Member States in the post-crisis period has revealed several interesting findings that can serve as guidelines for future policies. It seems that the fastest growing regions across the analyzed countries are also those with the fastest growing share of manufacturing in their value added. Such reasoning signals are repositioning European industries towards sophisticated industries characterized by high value added, knowledge and technological intensity. The results of the econometric investigation further support that story. The growth of manufacturing value added and contraction of the workforce can be understood as signs of movement from labor towards knowledge-intensive activities. While the former findings breathe some optimism the results related to inter-regional effects are somewhat worrying. It appears that the development of the analyzed regions bears many resemblances to theoretical core-periphery models. It seems that backwash effects such as outflows of workers towards more prosperous areas have an adverse effect on peripheral regions. Yet our findings also suggest that spread effects in the production chain might also be in place.

Future industrial policy will have to find instruments for a more balanced distribution of economic activity and the strengthening of linkages between economic entities in different geographic areas. These measures will have to include not only incentives for firms in core areas to source some of their activities to the periphery in order to reduce development gaps and strengthen EU integration, but more importantly, measures aimed at the strengthening of competitiveness for firms in the periphery. These tasks will have to be complemented with structural measures aimed at the positioning of European industries within the quality-driven segment of the global market.

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